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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

S
Insect Control
District 6

The Forest Insect Situation in Oregon and Washington January 15, 1929.

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Maps

The General Situation

Douglas fir problem:

The Douglas fir forests and their associated species on the west side of the Cascades in Oregon and Washington still continue to be fairly free of epidemic insect losses. Since 1921 there has been no repetition of such destructive defoliations as occurred in Tillamook County, Oregon, and which resulted in the death of nearly one-half billion board feet of western hemlock and Douglas fir. This loss was caused by the western hemlock looper (Ellopia fervidaria). During the past three years, there has been some infestation by barkbeetles in the pure stands of Sitka spruce near the coast on the Olympic Peninsula. Fortunately, this beetle work has not yet been found to any appreciable extent in the better quality Sitka spruce in the upland type where it occurs in mixture with Douglas fir and western hemlock.

Lodgepole infestations:

Lodgepole infestations by the mountain pine beetle (Dendroctonus monticolae) have recently been active with extreme severity in many parts of Oregon and Washington. In some cases, the infestations involved lodgepole of fairly good quality which might reasonably have been expected to be marketable within a decade or two. In most cases, however, the beetle-killed lodgepole is located in high mountain areas where watershed protection is its major value, or is situated on volcanic soils and pumice flats where it seldom grows large enough to be of much value under present economic conditions. In a few instances, these lodgepole infestations have damaged or threatened areas of high recreation and scenic value. In any event, these lodgepole killings, inasmuch as usually one-half or more of the stand is killed, create high fire hazards that present real problems in any adequate fire protection plan. Especially is this true when these lodgepole killings are in the vicinity of merchantable timber. In the last five years, these lodgepole deadenings have covered at least 300,000 acres in Oregon and Washington. In Oregon, the Deschutes, Fremont, Umpqua, and Crater National Forests have suffered the most. In Washington, the Chelan and the Wenatchee National Forests have been hit the hardest. Except for

recreation and scenic areas of high value, control work against these epidemics is hopelessly out of the question because of the tremendous number of trees infested at any given time and because of the relatively low values to be protected.

The mountain pine beetle infestations in lodgepole affect western yellow pine stands to some extent. On the Chelan National Forest in Washington, this is particularly true. On that Forest much of the western yellow pine is in close proximity to pure lodgepole forests or intimately mixed with lodgepole. Recent epidemic outbreaks in the lodgepole on the Chelan first became evident in 1922. The very next year, the western yellow pine near the infested lodgepole or in mixture with the lodgepole began to suffer. The mountain pine beetle loss in yellow pine for the entire Forest probably exceeds 250,000 M. board feet during the period 1923-1928. In many cases, however, the western pine beetle and the mountain pine beetle are both involved in the death of this yellow pine timber. It is true also that the mountain pine beetle attacks in yellow pine on the Chelan rarely extend with severity more than one-half mile into the pure yellow pine stands. At present, it is probable that the yellow pine timber on this Forest is too low in value to justify large control operations, but it is likely that within a decade such operations can be justified by the increase in timber values. However, in this type of infestation, namely mountain pine beetle attacks in mixed lodgepole-yellow pine forests, such control work must be preceded by research to determine the exact relationship between the lodgepole attacks and the concurrent and nearby yellow pine attacks by the mountain pine beetle.

In other parts of Oregon and Washington, mountain pine beetle attacks in lodgepole usually result in some damage to nearby yellow pine but not nearly to the extent prevalent on the Chelan.

White pine losses:

Wherever western white pine occurs in Oregon and Washington, it continues to be severely attacked by the mountain pine beetle. Portions of the Wenatchee and Columbia

National Forests in Washington, and the Cascade and Santiam National Forests in Oregon have abundant reproduction of this valuable tree. As soon as it reaches a diameter of eight or more inches, the work of the mountain pine beetle begins and relegates the tree to a very secondary place in the mixed forest in which it usually occurs. It is true, of course, that the blister rust menace makes the encouragement of western white pine a rather dubious undertaking. Nevertheless, I feel that a study of the possibility of protecting this tree against beetle attacks deserves some attention. Any one who has seen the rapid growth and the fine quality of the western white pine which has escaped beetle destruction in this District, is invariably impressed with the need for giving this insect problem some serious study.

Yellow pine infestations

Western pine beetle (Dendroctonus brevicomis) epidemics in mature stands of yellow pine still constitute the most important insect problem in the District. Ordinarily, epidemics by this beetle have involved the annual loss of one or two per cent of the yellow pine volume. Within the past few years, the western pine beetle has been found to kill as much as fifteen per cent annually on certain restricted areas in southern Oregon. Whatever the reasons for it may be, brevicomis epidemics of long standing have a tendency to grow progressively worse until one-half or more of the timber is killed. This point is brought out because there is occasionally some tendency on the part of forest officers and timber owners to minimize the beetle menace by assuming that even under the worst conditions only one or two per cent of the yellow pine is killed annually and that, considering large areas, growth replaces beetle loss.

The large amount of beetle survey work done in the western yellow pine of Oregon and Washington during the past seven years by the writer has convinced me that, in a general way, the yellow pine stands of the District can be divided into three broad classes as regards their susceptibility to beetle damage:-

1. Yellow pine rarely susceptible to brevicomis epidemics.

2. Yellow pine occasionally susceptible to brevicomis epidemics.

3. Yellow pine chronically susceptible to brevicomis epidemics.

Such a classification of the yellow pine on the National Forests of Oregon and Washington is of real value in determining upon a sales policy. It is readily admitted, however, that the timber in Class 2 may eventually, for instance, go into Class 3, for example, and that the classification is not a permanent one. It is proposed to take this matter up in considerable detail in a subsequent report.

In addition to the brevicomis epidemics recommended for control during the present fiscal year and those listed as possible control projects for the fall of 1929, there are certain brevicomis infestations in the District which need special watching. These areas of hazard include, in particular:-

A. Washington.

1. Entiat drainage - Wenatchee.
2. Wall Creek burn - Umatilla.

B. Oregon.

1. Sisters and Fort Rock districts - Deschutes.
2. South Fork Burnt River - Whitman.
3. Portions of the Silver Lake, Paisley, Bly, and Warner districts - Fremont.
4. Fort Klamath district - Crater.

The above areas are mentioned primarily to indicate the widespread distribution of brevicomis activity in the District.

Fire and insects:

Research by the Bureau of Entomology on the effect of fires in western yellow pine on subsequent brevicomis attacks has brought out the fact that frequently large but rather temporary increases in brevicomis activity can be expected. This general conclusion has been borne out by observations by the writer in various parts of Oregon and Washington, except that possibly these beetle increases may not always prove to be of short duration. Two large yellow pine burns, both occurring in the summer of 1926, now contain severe epidemics of the western pine beetle which show no

signs of abatement. One is a burn of about 10,000 acres which occurred in the Fort Rock district of the Deschutes National Forest in August, 1926, and which now is the scene of an apparently very virulent brevicomis epidemic in the general region of a large yellow pine forest fairly free of beetle activity. This epidemic is being recommended for control operations during the coming spring. The other fire is the Mill Flat-Bobs Lake fire which took place in July, 1926, on the Fremont and covered over 6,000 acres. This burn and the yellow pine immediately adjoining the burn are being heavily attacked by brevicomis. It may prove desirable to fight this epidemic. During the past few years it has become rather evident that in our current beetle survey work it is very desirable to give special attention to the yellow pine burns.

Cooperation with private owners:

The Klamath Forest Protective Association still acts as the representative of the larger timber owners in Lake and Klamath Counties in southern Oregon. Although the Weyerhaeuser Timber Company and the Long-Bell Lumber Company have been the most active members of the Association in insect control work, many of the smaller owners continue to show interest in beetle control. The high timber values in this section of Oregon have been a stimulus to this work. Although cooperation with the Association has been fairly satisfactory, yet both the Forest Service and the Association have been handicapped in the working out of a systematic and adequate plan of action by the occasional inability to secure funds. Inasmuch as in many cases the beetle epidemics in southern Oregon involve both private and national forest timber at the same time, inadequate funds during even a single control season badly upsets the plans and may partially nullify the work of a previous season by the failure to carry on the proper follow-up operations. For financing the Forest Service share of the work in the southern Oregon region, the ideal arrangement is provision for an appropriation which will continue to be available until spent. It is realized, however, that it is difficult to secure an appropriation on such terms. During the past three years, it has not been possible to secure as good results in the control work done in cooperation with the Association as would have been the case under an adequately financed and well-planned program. The Association has had some difficulty in securing the necessary money for its share of the work, but, to some measure at least, this has been due to the uncertainty as to

what the Forest Service will be able to do in carrying out a general program for a period of years in the future.

In the Sisters district of the Deschutes, north of Bend, Oregon, the Hill interests have signified an interest in cooperating with the Forest Service in the event of control operations in that region. In the Fort Rock district of the Deschutes, both the Brooks-Scanlon and Shevlin-Hixon interests have shown willingness to aid in any fight which may be undertaken by the Forest Service against the western pine beetle. In other parts of Oregon and in central Washington, there is a growing concern over the forest insect problem and ways and means of meeting it. In fact, favorable sentiment toward control operations in yellow pine is so general in Oregon and Washington that it is not believed that there will be much difficulty in carrying out cooperative projects with the timber owners wherever such projects may be considered desirable by the Forest Service and the Bureau of Entomology.

The Western Forestry and Conservation Association has a standing committee on insect control which has been active for two years in acquainting itself with the forest insect situation as it affects the timber owners. In correlating the work of the various federal agencies in the handling of the insect problem, the Regional Forest Protection Board has proven a real help.

Projects Recommended for Fiscal Year 1929

Summary of recommendations:

In order of their importance and urgency, control work is recommended on the following projects:

1. Fox Butte area in Fort Rock district of Deschutes National Forest. Total area is about 8,000 acres divided as follows:

   3,500 acres - Deschutes National Forest.
   4,500 acres - Brooks-Scanlon.

   Yellow pine burn of August, 1926. Epidemic infestation of D. brevicomis in green and scorched timber. Infested trees loaded with healthy brood of larvae. Infestation is rapidly increasing and

threatens adjacent national forest and private timber now fairly free of beetle activity. Timber valued at from $3.50 to $4.00 per thousand board feet. Cost of project estimated as follows:-

Forest Service share - $4,500
Brooks-Scanlon share - 3,000

Cost estimates are based on $4.00 per thousand board feet and following infested volumes to be treated:-

Forest Service - 1,100 M. bd. ft.
Brooks-Scanlon - 750 " " "

2. Sand Creek area on Crater National Forest. Total national forest area involved, 1,500 acres, immediately adjoining east boundary of Crater Lake National Park. Continuation of control work done by Forest Service in lodgepole in 1927 and 1928. Estimated cost of Forest Service work in spring of 1929 is $1100. This will provide for treatment of 1,000 lodgepole trees. It is necessary for work to be done at the same time by National Park Service on national park timber immediately adjoining in order for Forest Service share of project to be effective.

3. Bly area on Fremont National Forest. Continuation of control operations in yellow pine in cooperation with Klamath Forest Protective Association north of South Fork of Sprague River. National forest area involved is about 5,000 acres. From 5,000 to 10,000 acres of Association timber included. Timber valued at from $4.00 to $4.50 per M. board feet. Work will probably result in temporary completion of Forest Service share of control operations in Area 3 of Southern Oregon-Northern California pine beetle control project, except Horsefly unit. Allotment needed is $2900 to supplement $1300 balance in Fremont allotment. Somewhat less than 1,000 M. board feet of infested yellow pine to be treated at a cost of $4.50 per M. board feet.

4. Diamond Lake area on Umpqua National Forest. About 500 acres of lodgepole along the shores of Diamond Lake are involved. This is to supplement control operations of 1926 and 1927 when a total of about 1500 trees were treated. Present infestation on this recreation area estimated at 150 trees. Estimated cost of the work is $200.

Fox Butte project ($4500)

A. Introductory statement. On August 12, 1926, a fire started in the vicinity of Fox Butte in the Fort Rock district of the Deschutes National Forest. A considerable part of the fire was in a pure yellow pine stand and a total area of 9,900 acres were burned over. At least one-half of the yellow pine was killed. In November, 1926, a study of the burn was made to determine whether there was any evidence of increased beetle activity after the fire. No increase was found. A similar examination was made in November, 1927. There had been a considerable increase in the beetle activity amounting to at least two or three times that of the previous year. However, a considerable number of the 1927 winter generation trees showed a high mortality in the attacking beetles, probably due to sour sap. A third examination in November, 1928 showed that there had been an increase in the summer 1928 trees over the winter 1927 trees, and that the increase of the winter 1928 trees over the summer 1928 amounted to three or four hundred per cent. These winter 1928 trees are for the most part heavily loaded with healthy looking larvae in the outer bark. A heavy emergence can reasonably be expected. Thus far, nearly all of the infestation (brevicomis) has been inside the burn. The burn is in close proximity to stands of yellow pine timber fairly free of beetle activity and it is feared that the heavy emergence of beetles which may take place next spring will result in the spread of the infestation into this timber.

B. Survey data. The yellow pine area involved in this infestation is estimated at 8,000 acres. Of this acreage, 3500 acres is part of the Deschutes National Forest and the remaining 4,500 acres belong to the Brooks-Scanlon Lumber Company. It is estimated that the national forest volume of infested yellow pine to be treated amounts to 1,100 M. board feet. Although the Brooks-Scanlon area is larger than the national forest portion, it is not believed that the company's infested volume exceeds 750 M. board feet. The timber to be protected against the spread of this infestation extends for many miles to the west and northwest, including primarily the

private and national forest timber within what is known as the South Ice Caves Block. This block contains about 90,000 acres of private and national forest yellow pine fairly free of brevicomis damage.

C. Recommendations and costs. It is recommended that control work be undertaken in the spring of 1929. Because of the concentration of the infestation, the accessibility of the area and its easy topography, it is believed that the control work can be done for $4.00 per thousand board feet. On this basis, the Forest Service work will cost about $4500 and the Brooks-Scanlon share $3,000. The Brooks-Scanlon Lumber Company has already indicated its readiness to consider a cooperative plan of action to handle this situation promptly.

2. Sand Creek project ($1100):

A. Introductory statement. This project was begun in the spring of 1927 and continued in the spring of 1928. In the 1927 work, nearly 4,000 lodgepole trees were treated at a cost of $2800. In the 1928 work, 1200 trees were treated at a cost of $1100. In the two years, therefore, 5200 trees were treated at a cost of $3900. The purpose of this work was to protect the lodgepole stands within the Crater Lake National Park from beetles emerging from national forest timber immediately adjoining the eastern boundary of this park. The Park Service began its control program on this lodgepole problem in 1925 and during the four years 1925-1928 inclusive, spet nearly $12,000 in the treatment of almost 10,000 lodgepole trees. Although only a small part of this money was spent in the close proximity of the national forest control operations, all of the control work needed inside of the Park to supplement the work done by the Forest Service just outside of the Park was completed by the Park Service with one exception. In the spring of 1928, the Park Service failed, at the last moment, to take care of an epidemic center of 300 trees immediately adjoining the 1928 Forest Service control operations north of Sand Creek.

B. Survey data. A field study in November, 1928, by the writer showed that there were about 1,000 trees to be treated on the 1500 acres covered by the 1927 and 1928 control operations. Many of these trees are in groups of from 5 to 50 trees and are heavily loaded with larvae. The infestation

is still in a virulent and epidemic status and it is believed that, in the absence of control work, the existing infestation may again resume its former proportions.

C. Recommendations and costs. It is recommended that this work be undertaken in the spring of 1929, provided that the Park Service undertakes similar work in the Pinnacle Valley country in the spring of 1929. To treat the 1,000 trees in the national forest area will require $1100. In November, 1928, I informally told Superintendent Thomson of this cost estimate and further told him that I believed that about $700 would be necessary to treat the Pinnacle Valley timber inside the Park. I emphasized that this latter estimate was subject to revision by Mr. Patterson of the Bureau. In Mr. Patterson's report of December, 1928, he estimated the infested trees in the Pinnacle Valley to be 500. The $700 estimate is therefore not far from the amount actually needed.

3. Bly project ($2900):

A. Introductory statement. In this project it is proposed to continue the control operations of 1927 and 1928 in Area 3 of the Southern Oregon-Northern California pine beetle control project, in cooperation with the Klamath Forest Protective Association. The 1927 and 1928 control operations were concentrated largely in the Owens, Whitworth and Quartz Valley units and were so planned and executed as to result in a solid body of beetle-free timber. As a consequence of this work, a unified block of national forest and intermingled private timber of about 35,000 acres has been freed, for the time being at least, from a destructive brevicomis epidemic. In parts of the area covered by the fall 1928 control work, the infestation was found to have declined from one-third to one-half from what it was in the general region in the spring of 1928. However, considering the control area as a whole, the decline between the summer 1928 and winter 1928 generation did not exceed one-third. For this reason, the Klamath Forest Protective Association and the Forest Service went ahead with their original control plans with only minor changes in the areas to be treated. A balance of $1300 remains in the original $6,000 allotment.

B. Survey data. In the fall, 1928, control operations by the Forest Service on this project, 9500 acres were covered and 950 M. board feet were treated at a total cost of $4700. The high cost was due to the fact that the fire hazard was so great in the latter part of October that burning had to be deferred until early November and even then it had to be done with great care in the brushy areas.

The control work of 1927 and 1928 extends from the southern boundary of the epidemic infestation in the Owens Unit northward to the South Fork of the Sprague River. It is now proposed to extend the control work north of the South Fork of Sprague River for several miles to tie up with the control operations which the Association is planning in the large Weyerhaeuser holdings immediately west of the Fremont boundary.

The proposed control operations would involve about 7500 acres of national forest yellow pine estimated to contain about 900 M. board feet to be treated next spring. The Association timber includes at least 10,000 acres and a proportionately greater volume to be treated. However, the Association covered part of this area in November, 1928.

The present situation is decidedly epidemic in character. The recent decline gives no promise of permanency.

C. Recommendations and costs. An allotment is recommended to carry on the Forest Service share of these control plans in the spring of 1929. The total cost of the work is estimated at $4200 for treating 900 M. board feet of yellow pine. This represents a cost of over $4.50 per M. board feet. Spring control work has proven to be more expensive than fall work due primarily to higher transportation and burning costs. Inasmuch as there is a balance of $1300 in the Fremont insect control allotment, an additional allotment of $2900 will be needed to carry this work.

Diamond Lake project($200):

A. Introductory statement. The purpose of this lodgepole project is to protect the remaining lodgepole trees near the shores of Diamond Lake from further monticolae

depredations. In 1926 and 1927, a total of about 1500 trees were treated on about 500 acres.

B. Survey data. The monticolae activity in the large lodgepole stands around Diamond Lake was very much less in 1928 than in 1927 and 1926. The overwintering infested trees at this time (January, 1929) are less than one-third in number of those that existed exactly a year ago. The control work apparently had a decided effect on the beetle situation along the lake shore in spite of the very general decrease of beetle activity in the Diamond Lake region. In the area covered by previous control operations, there are about 150 infested lodgepole trees mostly in the form of small groups and situated on important camp grounds.

C. Recommendations and costs. It is recommended that control work be undertaken at Diamond Lake in June, 1929, and that the sun-curing method be used. It is estimated that 150 trees are in need of treatment and that $200 will be required for the work. The high recreation values at stake here and the importance of the lodgepole trees to campers are well known and require no emphasis. It is realized that entomologically this entire project has a weak basis and that therefore favorable results from control work may not be secured. The relatively high values at stake and the small cost of project seem, however, to justify the consideration of this project.

Possibilities for Fall of 1929

It is still much too early to either enumerate the control projects or more than guess at the cost of the control projects which may be presented for consideration in the fall, 1929 program. However, it is already evident that there are certain possibilities, all of them brevicomis epidemics in yellow pine stands. Fall control operations are apparently giving better results than spring work. In certain areas where the fire hazard is great on account of snags and underbrush, fall work is much cheaper and safer. In addition, there are parts of southern Oregon which are almost impassable in the spring months and which can be much more cheaply and easily reached during the fall control season.

In the following list, the cost figures are nothing more than guesses but they serve to give an idea of the size of the projects. No attempt has been made to list them in order of their importance.

Fremont National Forest:

1. Chewaucan Basin in Paisley district. Involves cooperation with Klamath Forest Protective Association. A migration of the epidemic into $4.00 stumpage is in progress. Forest Service share about $10,000.

2. Mill Flat-Bobs Lake burn. Fire occurred in July, 1926, and covered about 6,000 acres of national forest timber. Infestation of epidemic severity in progress in green timber around the burn as well as in burn. $5,000.

3. Horsefly unit. Cooperation with Klamath Forest Protective Association. Probably one-third of timber in this unit killed by beetles since 1918. Overwintering infested trees average 100 per section. Forest Service share of project - $4,000.

Deschutes National Forest:

1. Recleaning of Fox Butte burn in event of spring, 1929 control operations in cooperation with Brooks-Scanlon. On basis of 40 per cent of original cost, this recleaning should not cost more than $2,000.

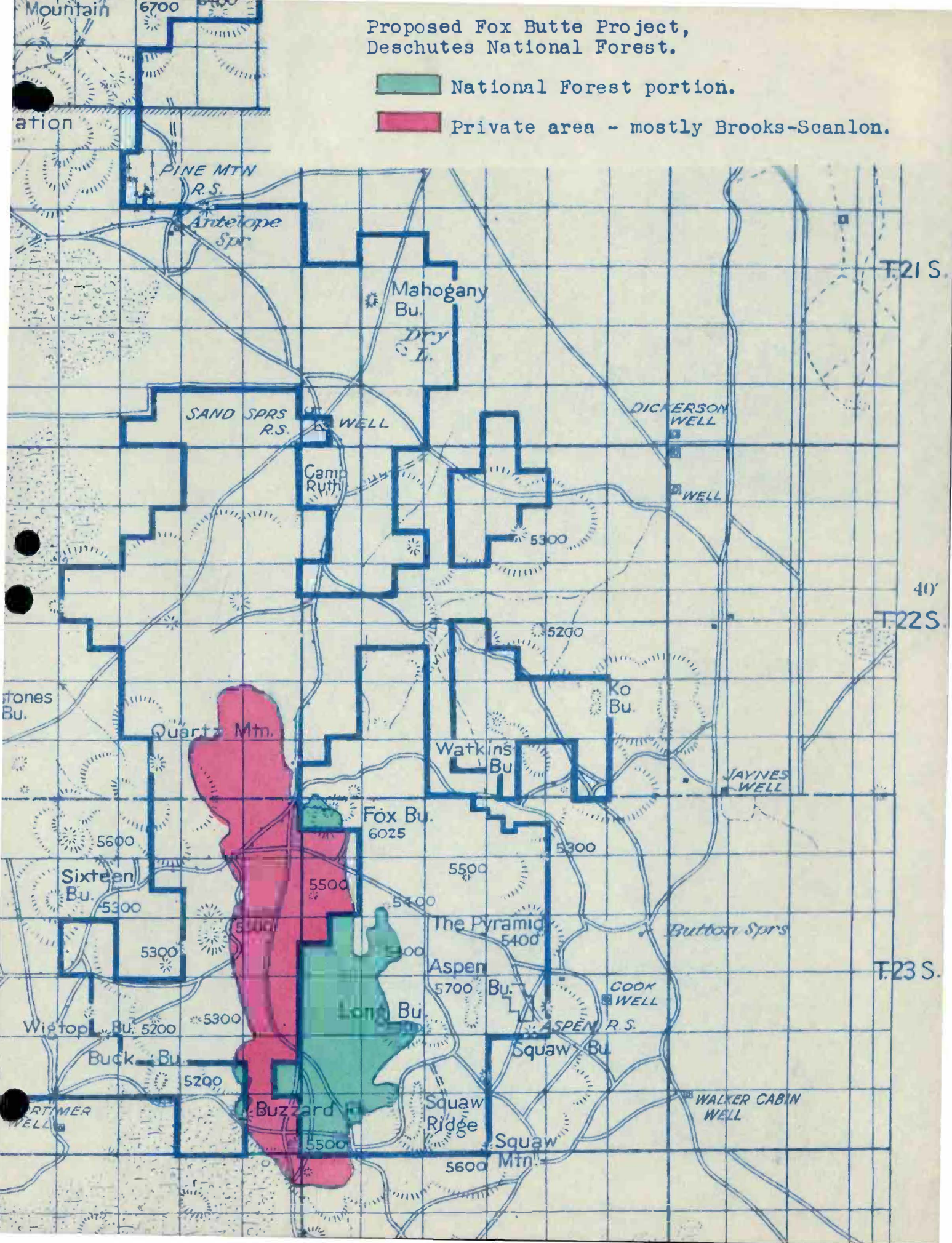
2. Summit Stage Station infestation. Described on page 13 of the report of January 3, 1927, entitled "Proposed Insect Control Projects." Involves cooperation with Shevlin-Hixon Lumber Company. Infestation again shows some evidence of returning to its former severity. Forest Service share not more than $3,000.

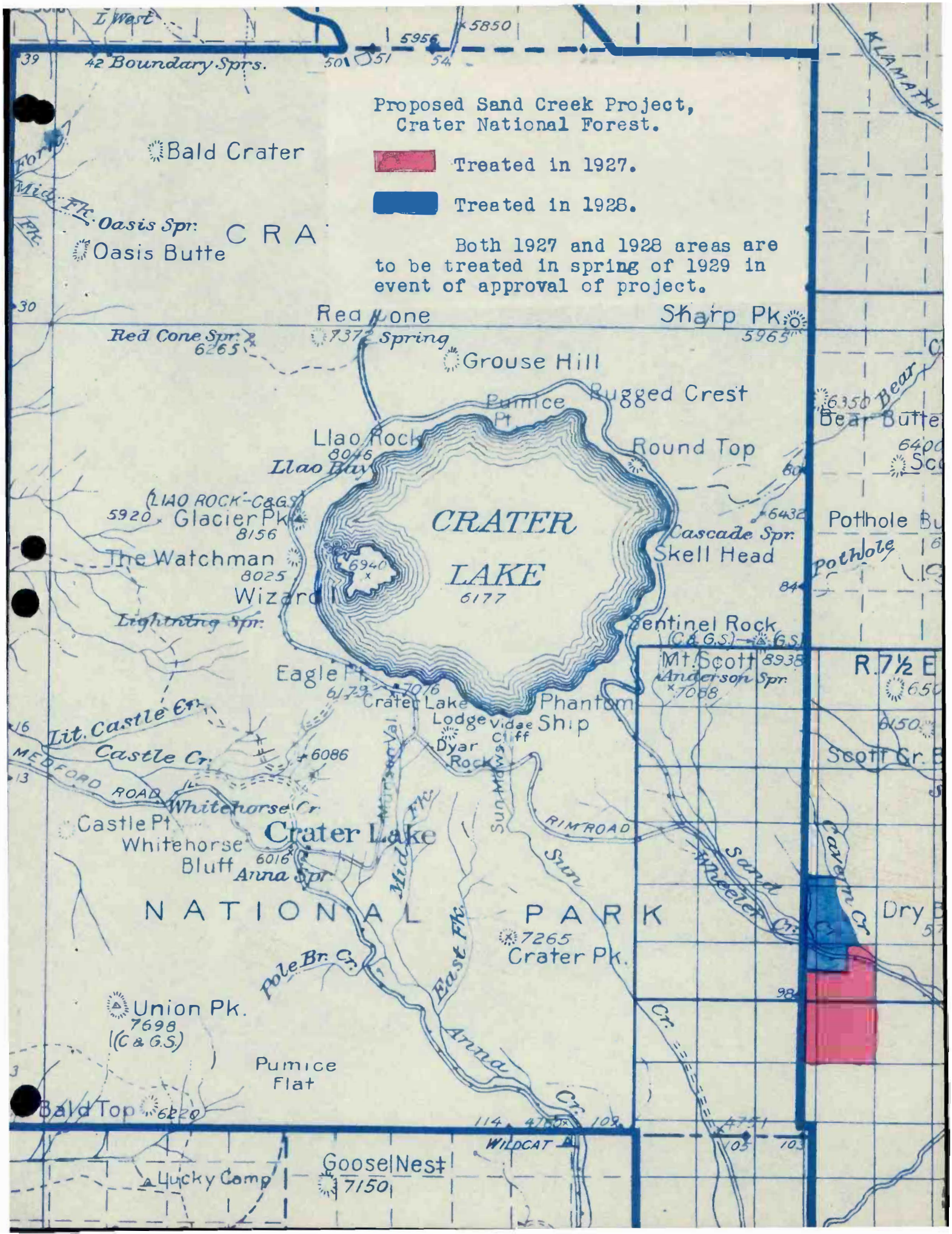
Crater National Forest:

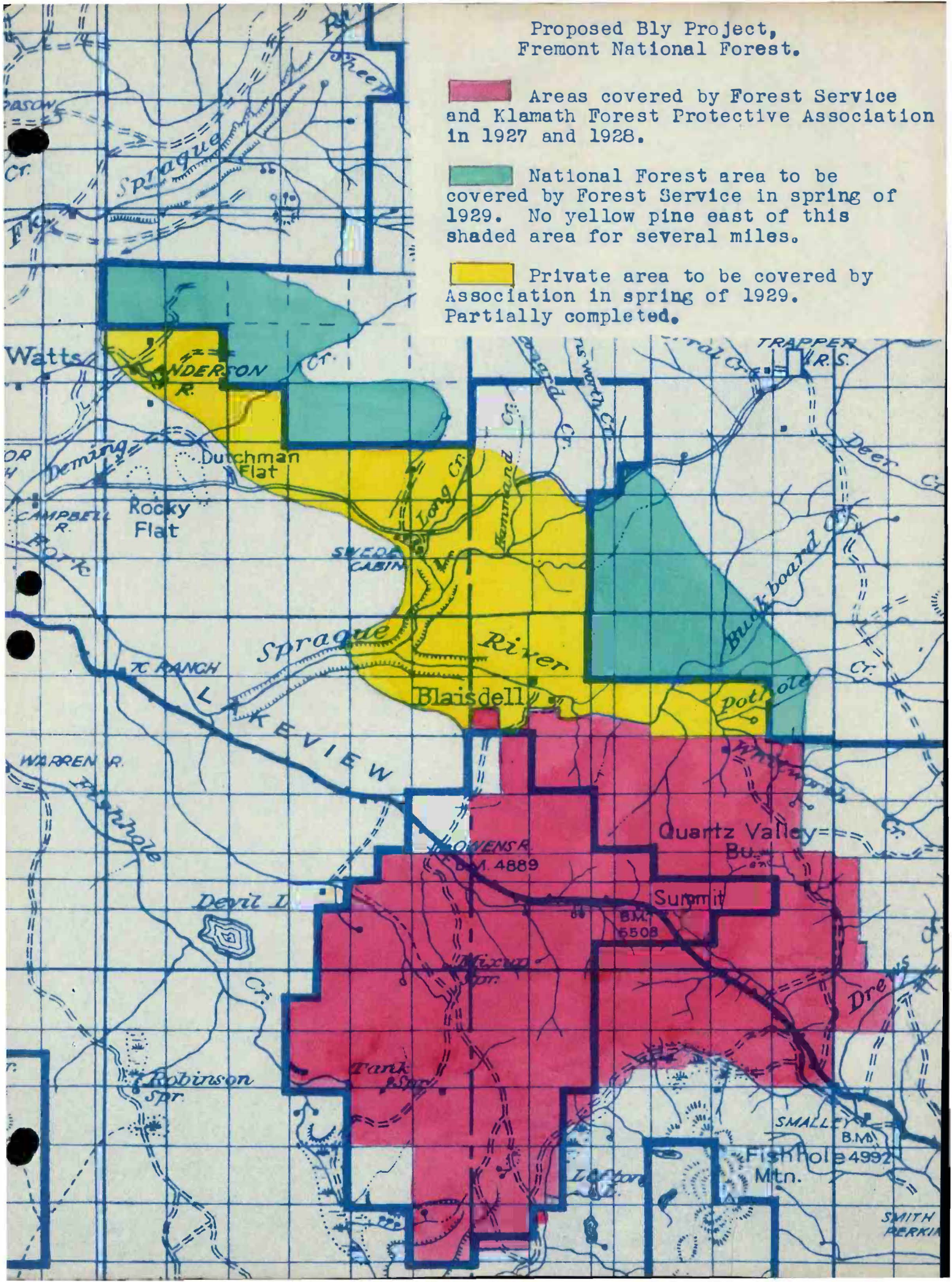
Seven Mile Project. Described on page 10 of the January 3, 1927 report entitled "Proposed Insect Control Projects." This infestation is just now at a much lower ebb

than was the case in October, 1926. However, the infestation is still in excess of normal in severity. This project is not very likely to come up for consideration in the fall of 1929.

A. J. Jaenicke,
Forest Examiner.


Proposed Fox Butte Project,
Deschutes National Forest.
National Forest portion.
Private area - mostly Brooks-Scanlon.
Mountain
6700
ation
PINE MTN R.S.
Antelope Spr.
Mahogany Bu.
Dry L.
T.21 S.
SAND SPRS R.S.
WELL
DICKERSON WELL
WELL
Camp Ruth
5300
40'
T.22 S.
5200
tones Bu.
Quartz Mtn.
Ko Bu.
Watkins Bu.
JAYNES WELL
Fox Bu.
6025
5600
5300
5500
Sixteen Bu.
5300
5500
5400
The Pyramid
5400
Button Spr's
5300
5300
Aspen
5700
Bu.
T.23 S.
COOK WELL
Long Bu.
ASPEN R.S.
Wiatopl Bu. 5200
5300
Buck Bu.
Squaw Bu.
5200
Buzzard
Squaw Ridge
WALKER CABIN WELL
5500
Squaw Mtn.
5600


Proposed Sand Creek Project,
Crater National Forest.
Treated in 1927.
Treated in 1928.
Both 1927 and 1928 areas are to be treated in spring of 1929 in event of approval of project.
Boundary Sprs.
Bald Crater
Oasis Spr.
Oasis Butte
CRA
Red Cone
Red Cone Spr.
6265
Spring
Grouse Hill
Pumice Pt.
Rugged Crest
Llao Rock
8046
Llao Bluff
Round Top
LLAO ROCK-C&GS
Glacier Pk.
8156
5920
CRATER
LAKE
6177
6940
Cascade Spr.
Skell Head
The Watchman
8025
Wizard I.
Lightning Spr.
Sentinel Rock
(C&GS)
Eagle Pt.
6179
7076
Crater Lake Lodge
Phantom Ship
Vidae Cliff
Dyar Rock
Sun Mows
Lit. Castle Cr.
Castle Cr.
6086
MEDFORD ROAD
Whitehorse Cr.
Castle Pt.
Whitehorse Bluff
Crater Lake
6016
Anna Spr.
Mid. Fk.
RIMROAD
Sun
NATIONAL PARK
7265
Crater Pk.
Pole Br. Cr.
East Fk.
Anna Cr.
Union Pk.
7698
(C&G.S.)
Pumice Flat
Bald Top
6220
Lucky Camp
Goose Nest
7150
WILDCAT
Mt. Scott
8938
Anderson Spr.
7088
Sand Wheeler Cr.
Raven Cr.
Scott Cr.
Dry
Potholes
Bear Butte
6358
R. 7½ E.
KLAMATH
Fork
Mid. Fk.
Fk.


Proposed Bly Project,
Fremont National Forest.
Areas covered by Forest Service and Klamath Forest Protective Association in 1927 and 1928.
National Forest area to be covered by Forest Service in spring of 1929. No yellow pine east of this shaded area for several miles.
Private area to be covered by Association in spring of 1929. Partially completed.
Watts
Dutchman Flat
Deming
Rocky Flat
Sprague River
Blaisdell
Lakeview
Quartz Valley
Summit
B.M. 6508
B.M. 4889
Devil L.
Robinson Spr.
Tank Spr.
Fishhole Mtn.
4992
Trapper R.
Deer Cr.
Buckboard Cr.
Long Cr.
Potholes
Warren R.
Fishhole
Anderson R.
Campbell R.
Fork
Sprague
Cr.